the t.bone

TWS 16 BT

UHF wireless system

th•mann
MUSIC IS OUR PASSION

user manual

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1 General notes

This user manual contains important information on the safe operation of the device. Read and follow all safety notes and all instructions. Save this manual for future reference. Make sure that it is available to all persons using this device. If you sell the device to another user, be sure that they also receive this manual.

Our products are subject to a process of continuous development. We therefore reserve the right to make changes without notice.

Symbols and signal words

This section gives an overview of the symbols and signal words used in this user manual.

Signal word	Meaning
DANGER!	This combination of symbol and signal word indicates an immediate dangerous situation that will result in death or serious injury if it is not avoided.
NOTICE!	This combination of symbol and signal word indicates a possible dangerous situation that can result in material and environmental damage if it is not avoided.

Warning signs	Type of danger
	Warning – danger zone.

2 Safety instructions

Intended use

This device is intended to be used for the wireless transmission of audio signals from microphones or instruments to amplifiers or active speakers. Use the device only as described in this user manual. Any other use or use under other operating conditions is considered to be improper and may result in personal injury or property damage. No liability will be assumed for damages resulting from improper use.

This device may be used only by persons with sufficient physical, sensorial, and intellectual abilities and having corresponding knowledge and experience. Other persons may use this device only if they are supervised or instructed by a person who is responsible for their safety.

Safety

DANGER!

Danger for children

Ensure that plastic bags, packaging, etc. are disposed of properly and are not within reach of babies and young children. Choking hazard!

Ensure that children do not detach any small parts (e.g. knobs or the like) from the unit. They could swallow the pieces and choke!

Never let children unattended use electrical devices.

NOTICE!

Operating conditions

This device has been designed for indoor use only. To prevent damage, never expose the device to any liquid or moisture. Avoid direct sunlight, heavy dirt, and strong vibrations.

NOTICE!

External power supply

The device is powered by an external power supply. Before connecting the external power supply, ensure that the input voltage (AC outlet) matches the voltage rating of the device and that the AC outlet is protected by a residual current circuit breaker. Failure to do so could result in damage to the device and possibly the user.

Unplug the external power supply before electrical storms occur and when the device is unused for long periods of time to reduce the risk of electric shock or fire.

NOTICE!

Risk of fire due to incorrect polarity

Incorrectly inserted batteries may destroy the device or the batteries.

Ensure that proper polarity is observed when inserting batteries.

NOTICE!

Possible damage by leaking batteries

Leaking batteries can cause permanent damage to the device.

Take batteries out of the device if it is not going to be used for a longer period.

3 Features and scope of delivery

The UHF wireless system TWS 16 BT is ideal for professional audio transmission, for example, at events, on rock stages and concert halls, in theatres and musicals, or in nightclubs.

the t.bone TWS 16 BT 800 MHz (item no. 223626)

Your UHF wireless system TWS 16 BT has the following components:

- 9.5" diversity receiver DS16R
  - Adjustable squelch
  - Two antennas for optimum reception quality
  - Very high sensitivity at a very high signal-to-noise ratio
  - Outputs: XLR, 1/4" socket
  - 9.5" or 19" rack mounting (side by side with a second TWS 16 receiver)
  - Operating voltage supply: DC 12 V ⎓
- Transmitter: Condenser clip-microphone for wind Instruments BT TWS

The system operates in one of 16 switchable channels (within a range of 800.875 MHz… 811.875 MHz). Four systems can be operated simultaneously.

Included accessories: 12 V power supply, hardware for rack mounting, cable with two 1/4" jacks, windscreen.

the t.bone TWS 16 BT 854 MHz (item no. 223628)

Your UHF wireless system TWS 16 BT has the following components:

- 9.5" diversity receiver DS16R
  - Adjustable squelch
  - Two antennas for optimum reception quality
  - Very high sensitivity at a very high signal-to-noise ratio
  - Outputs: XLR, 1/4" socket
  - 9.5" or 19" rack mounting (side by side with a second TWS 16 receiver)
  - Operating voltage supply: DC 12 V ⎓
- Transmitter: Condenser clip-microphone for wind Instruments BT TWS

The system operates in one of 16 switchable channels (within a range of 854.375 MHz… 861.875 MHz). Four systems can be operated simultaneously.

Included accessories: 12 V power supply, hardware for rack mounting, cable with two 1/4" jacks, windscreen.

the t.bone TWS 16 BT 863 MHz (item no. 223629)

Your UHF wireless system TWS 16 BT has the following components:

- 9.5" diversity receiver DS16R
  - Adjustable squelch
  - Two antennas for optimum reception quality
  - Very high sensitivity at a very high signal-to-noise ratio
  - Outputs: XLR, 1/4" socket
  - 9.5" or 19" rack mounting (side by side with a second TWS 16 receiver)
  - Operating voltage supply: DC 12 V ⎓
- Transmitter: Condenser clip-microphone for wind Instruments BT TWS

The system operates in one of 15 switchable channels (within a range of 863.125 MHz… 864.875 MHz). Three systems can be operated simultaneously.

Included accessories: 12 V power supply, hardware for rack mounting, cable with two 1/4" jacks, windscreen.

the t.bone TWS 16 BT 600 MHz (item no. 269805)

Your UHF wireless system TWS 16 BT has the following components:

- 9.5" diversity receiver DS16R
  - Adjustable squelch
  - Two antennas for optimum reception quality
  - Very high sensitivity at a very high signal-to-noise ratio
  - Outputs: XLR, 1/4" socket
  - 9.5" or 19" rack mounting (side by side with a second TWS 16 receiver)
  - Operating voltage supply: DC 12 V ⎓
- Transmitter: Condenser clip-microphone for wind Instruments BT TWS

The system operates in one of 16 switchable channels (within a range of 606.225 MHz… 629.825 MHz). This frequency range is specially intended to be used in Great Britain. Three systems can be operated simultaneously.

Included accessories: 12 V power supply, hardware for rack mounting, cable with two 1/4" jacks, windscreen.

the t.bone TWS 16 BT 740 MHz (item no. 269807)

Your UHF wireless system TWS 16 BT has the following components:

- 9.5" diversity receiver DS16R
  - Adjustable squelch
  - Two antennas for optimum reception quality
  - Very high sensitivity at a very high signal-to-noise ratio
  - Outputs: XLR, 1/4" socket
  - 9.5" or 19" rack mounting (side by side with a second TWS 16 receiver)
  - Operating voltage supply: DC 12 V ⎓
- Transmitter: Condenser clip-microphone for wind Instruments BT TWS

The system operates in one of 16 switchable channels (within a range of 740.625 MHz… 751.500 MHz). This frequency range is intended for use in Germany with regard to LTE. Three systems can be operated simultaneously.

Included accessories: 12 V power supply, hardware for rack mounting, cable with two 1/4" jacks, windscreen.

the t.bone TWS 16 BT 821 MHz (item no. 273716)

Your UHF wireless system TWS 16 BT has the following components:

- 9.5" diversity receiver DS16R
  - Adjustable squelch
  - Two antennas for optimum reception quality
  - Very high sensitivity at a very high signal-to-noise ratio
  - Outputs: XLR, 1/4" socket
  - 9.5" or 19" rack mounting (side by side with a second TWS 16 receiver)
  - Operating voltage supply: DC 12 V ⎓
- Transmitter: Condenser clip-microphone for wind Instruments BT TWS

The system operates in one of 16 switchable channels (within a range of 821.725 MHz… 831.450 MHz). Four systems can be operated simultaneously.

Included accessories: 12 V power supply, hardware for rack mounting, cable with two 1/4" jacks, windscreen.

4 Installation and starting up

4.1 General information

Unpack and check carefully there is no transportation damage before using the unit. Keep the equipment packaging. To fully protect the device against vibration, dust and moisture during transportation or storage use the original packaging or your own packaging material suitable for transport or storage, respectively.

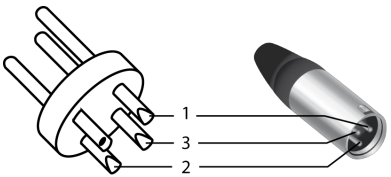
Establish all connections as long as the unit is switched off. Use the shortest possible high-quality cables for all connections.

Notes on wireless transmission

- This product utilizes frequencies that are not harmonized within the European Union (EU) and therefore may only be used in certain EU member states. Before you start, make sure the frequencies are allowed in the respective country.
- Make sure, that transmitter and receiver are both tuned to the same channel.
- Never set multiple transmitters to the same channel.
- Make sure that there are no metal objects between the transmitter and receiver.
- Avoid interference from other radio systems, television or radio sets.

4.2 Receiver

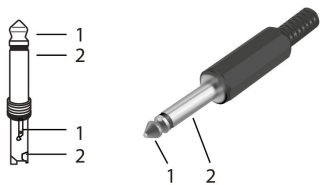
XLR connectors for signal output on the receiver



The receiver offers a XLR mounting plug for signal output. Drawing and table indicate the XLR pin assignment (balanced).

1	Ground, shielding
2	Positive signal (+)
3	Negative signal (–)

1/4" phone socket for signal output on the receiver



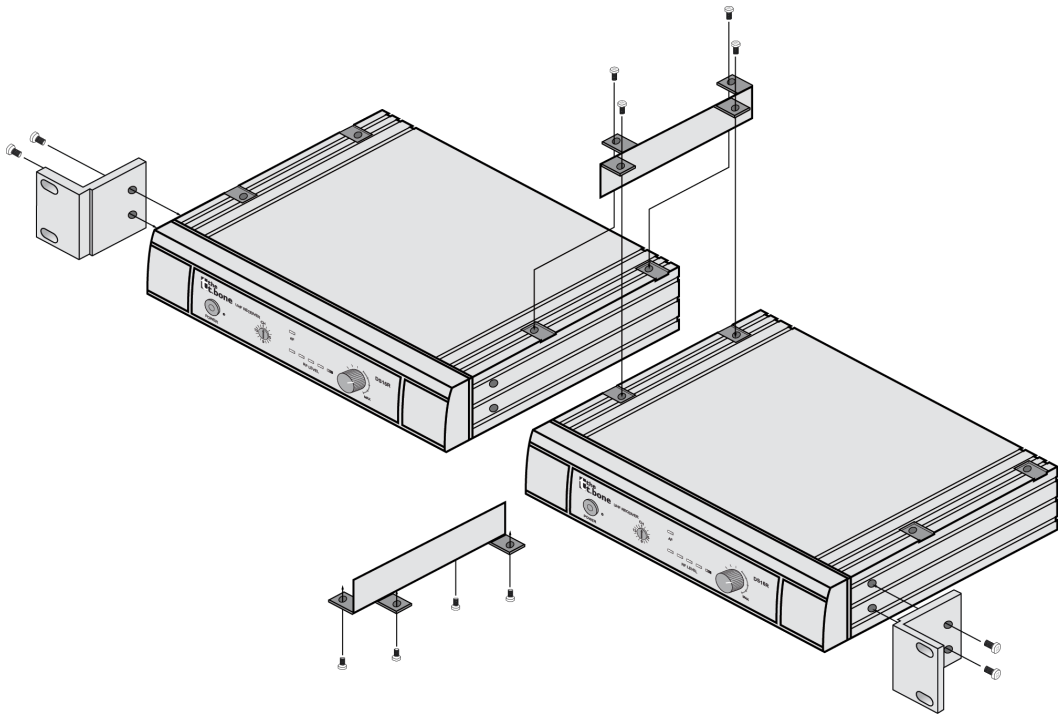
The receiver offers a 1/4" mono phone socket for signal output. Drawing and table indicate the pin assignment for a suitable TS jack.

1	Signal
2	Ground, shielding

Rack mounting

This device is designed for 9.5" rack mounting, it occupies 1 rack unit. The required mounting hardware is included.

Two units can be mounted side by side in a 19" rack slot. Connect both units using the supplied connecting brackets as shown in the drawing below.



Connecting the supply voltage

NOTICE!

External power supply

The device is powered by an external power supply. Before connecting the external power supply, ensure that the input voltage (AC outlet) matches the voltage rating of the device and that the AC outlet is protected by a residual current circuit breaker. Failure to do so could result in damage to the device and possibly the user.

Unplug the external power supply before electrical storms occur and when the device is unused for long periods of time to reduce the risk of electric shock or fire.

First connect the AC adaptor to the receiver and then plug the adaptor into the outlet.

Hooking up audio connections and starting up

Connect one of the audio outputs of the receiver to your mixer or amplifier. Make sure that only one of the two outputs of the receiver is used at the same time. Otherwise, interferences can by caused.

First adjust the volume control (6) as follows:

- If you use a microphone input of your mixer, turn the knob to about 1 o'clock. The audio level at the output sockets will be about 77 mV.
- If you use a line input of your mixer, turn the knob clockwise to the right stop. The audio level at the output sockets will be about 770 mV.

In order to achieve optimal sound quality, a fine adjustment may be required.

4.3 Transmitter

Inserting batteries into the transmitter

Open the battery compartment cover (20) by pressing the tab highlighted by 'PUSH' and insert the battery. Pay attention to the correct alignment of the poles. Close the battery compartment and turn on the transmitter. The LED (15) lights up briefly.

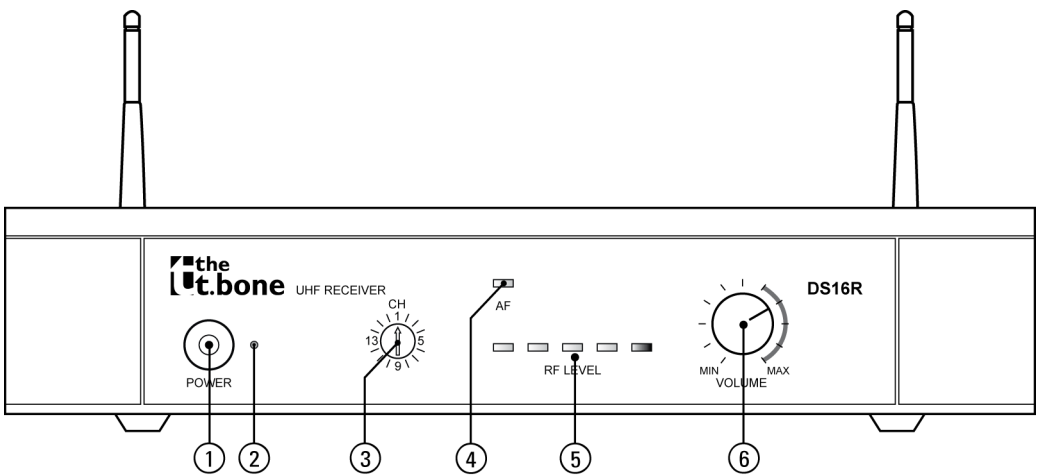
Taking the transmitter into operation

- Make sure that the transmitter is switched off, so the main switch (14) is in 'OFF' position.
- Adjust the gain with the 'GAIN' control (16) to a medium value. Use a suitable screwdriver.
- Use the clip to attach the transmitter to your instrument. The gooseneck allows optimum positioning of the microphone. The inclination and the spring tension of the clip are adjustable so that the transmitter can be optimally adapted to the instrument.
- If you notice disturbing noises by direct air flow attach the supplied windscreen on the microphone.
- Turn on the transmitter and the receiver and test the transmission by playing the instrument. If necessary, adjust the gain of the transmitter (using the 'GAIN') and the levels on your mixer or amp.

5 Components and functions

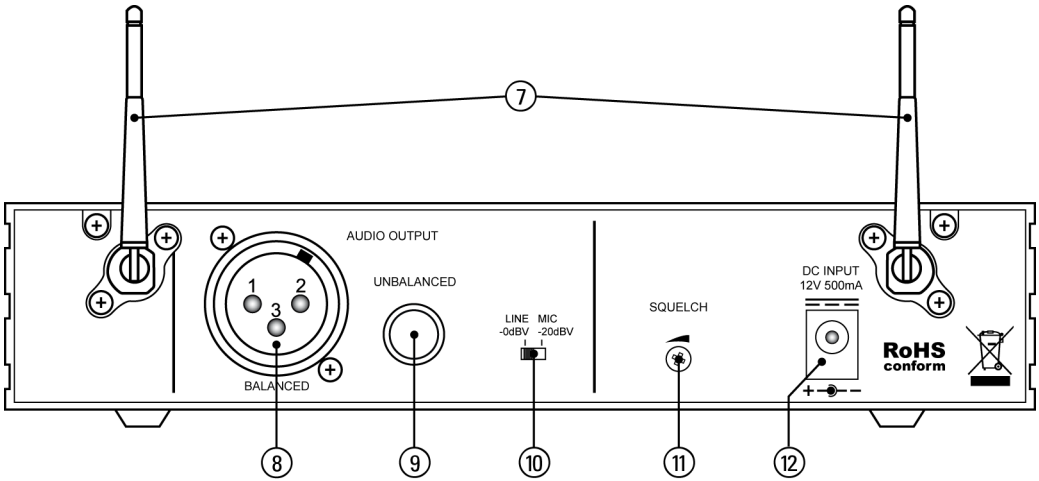
5.1 Receiver

Front panel



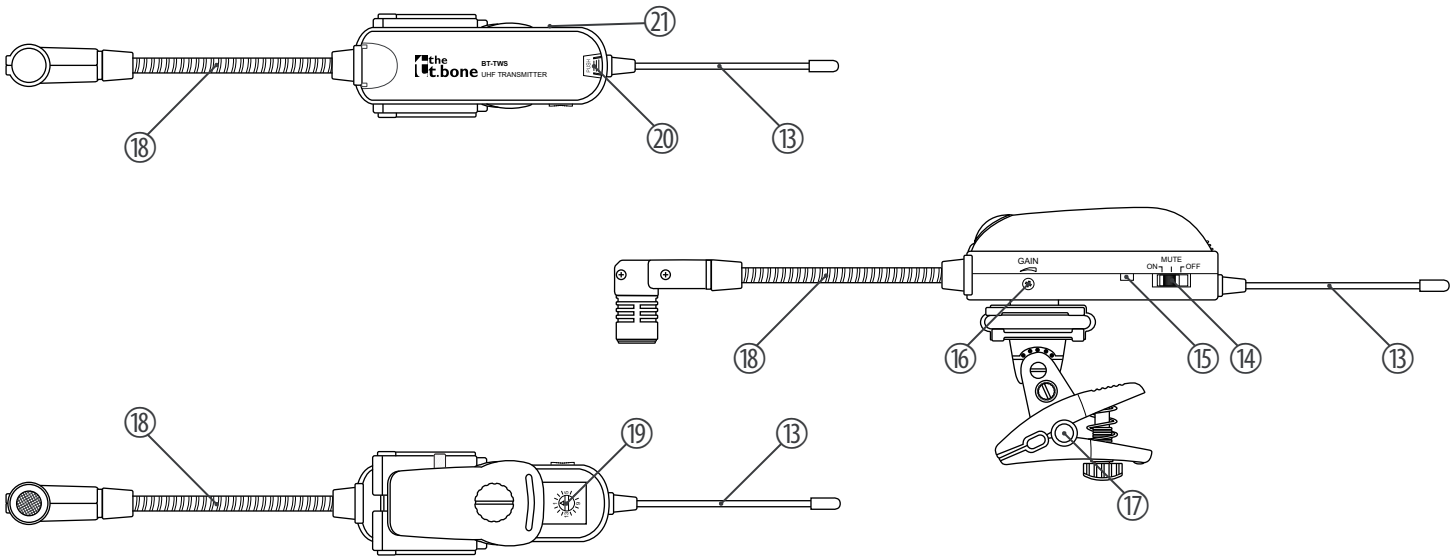
1	POWER Main switch to turn the device on and off.
2	This indicator lights up red when the unit is turned on and operational.
3	CH Rotary control to select a channel 1 to 16.
4	AF This indicator lights up red when an audio signal is received.
5	RF LEVEL These LEDs indicate the strength of the received carrier signal. The more LEDs light up, the better is the reception. If no LED is lit no signal is received.
6	VOLUME Use this control to adjust the output level of the two audio outputs on the rear panel.

Rear panel


7
AUDIO OUTPUT
UNBALANCED
1
2
3
BALANCED
LINE -0dBV
MIC -20dBV
SQUELCH
DC INPUT
12V 500mA
RoHS
conform
8
9
10
11
12

7	Tuned UHF antennas. The receiver evaluates the radio signal from both antennas and selects the signal with the highest quality for further processing.
8	AUDIO OUTPUT – BALANCED XLR mounting plug as balanced audio output for the direct connection to a mixing console, power amp, or recording device
9	AUDIO OUTPUT – UNBALANCED 1/4" phone socket as unbalanced audio output for the direct connection to a mixing console, power amp, or recording device
10	LINE/MIC Switch for adjusting the levels of the audio outputs. Select the '–0dBV' position when connecting the audio output of the unit to a line level input. Select the '–20dB' position when connecting the audio output to a mic level input.
11	SQUELCH Use this control to set the threshold for the squelch. Note: Setting the threshold too high will reduce the dynamic of the system.
12	DC INPUT Connect the supplied wall plug transformer to this socket. If you want to use a different power supply you have to consider the correct voltage, polarity of the plug, and the power consumption.

5.2 Transmitter



13	Flexible antenna
14	ON/MUTE/OFF Main switch. Either to turn the device on and off or to mute it.
15	LOW BATT Shows the charging level of the battery. If you turn on the transmitter the LED briefly lights up and indicates that the battery supplies a sufficient voltage. If the LED is lit continuously the battery is depleted. In this case, the battery should be changed or -if applicable- recharged.
16	GAIN Rotary control to adjust the input sensitivity to the level of the input signal.
17	Adjustable clip to be connected to your instrument.
18	Gooseneck
19	CHANNEL Rotary control to select a channel 1 to 16.

20	Battery compartment for one micro battery (AAA, LR03), 1.5 V or rechargeable battery.
21	Indication of the frequency range in which the device operates. This specification must match the indication printed on the underside of the receiver.

6 Troubleshooting

Following we list a few common problems that may occur during operation. We give you some suggestions for easy troubleshooting:

Symptom	Remedy
No sound	1. Check the operating voltage supply of transmitter and receiver.
	2. Make sure that transmitter and receiver operate within the same frequency range. The respective frequency range is indicated on the units.
	3. Are both transmitter and receiver set to the same channel?
	4. Check the connection between the receiver and the connected audio device (amplifier, mixer). Is the connected audio device turned on and is the output level of the receiver well adjusted for the audio input device?
	5. Try to improve the transmission by moving the transmitter closer to the receiver. Maybe the 'SQUELCH' controller is set too high.

Symptom	Remedy
	6. See if any metal parts near the transmitter or receiver interfere with the transmission.
Transmission is disrupted	1. Change the orientation of the antennas.
	2. If you use more than one wireless system at the same time, control the frequencies and channels used. The systems should work within separate frequency ranges.
	3. Also televisions, radios, or mobile phones can cause interference.
Sound is distorted	Change the setting of the 'VOLUME' controller on the receiver.

If the procedures recommended above do not succeed, please contact our Service Center. You can find the contact information at *www.thomann.de*.

7 Technical specifications

7.1 Receiver

Output	XLR mounting plug, balanced 1/4" phone socket, unbalanced
Carrier frequency	UHF band (518…928 MHz)
Modulation type	Frequency modulation (FM)
Oscillator	PLL synthesizer, 15 or 16 channels, depending on model version
Intermediate frequency	1: 243.95 MHz; 2: 10.7 MHz
Frequency stability	± 0.005 %
Signal-to-noise ratio	> 94 dB, @ 48 kHz deviation and 60 dBµV from antenna input
Normal deviation	± 20 kHz
Image and spurious rejection	80 dB min.

Input sensitivity	8 dBµV
Selectivity	> 50 dB
Pilot tone	32.768 kHz
Audio frequency response	50 Hz…15 kHz (±3 dB)
THD	< 1 %
Dynamic range	> 96 dB
Operating voltage	DC 12 V
Dimensions (W × D × H, w/o antennas)	210 mm × 189 mm × 50 mm
Weight	515 g

7.2 Transmitter

Carrier frequency	UHF band (518…928 MHz)
Modulation type	Frequency modulation (FM)
Oscillator	PLL synthesizer, 15 or 16 channels, depending on model version
Transmission power	10 mW max.
Frequency stability	±0.005 %
Normal deviation	±20 kHz
Spurious emission	> 60 dB below carrier frequency
THD	< 1 %
Pilot tone	32.768 kHz
Voltage supply	1 × micro (AAA, LR03, 1.5 V) or rechargeable battery
Current draw	130 mA ±10 mA

Dimensions (W × D × H, w/o antenna and wind shield)	175 mm × 33 mm × 90 mm
Width with antenna	245 mm
Weight (w/o batteries)	56 g

7.3 Frequency charts

the t.bone TWS 16 BT 800 MHz (item no. 223626)			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	800.875	9	806.625
2	801.375	10	807.375
3	802.375	11	807.875
4	803.125	12	808.375
5	803.875	13	809.125
6	804.500	14	810.250
7	805.125	15	810.875
8	805.875	16	811.875

the t.bone TWS 16 BT 854 MHz (item no. 223628)			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	854.375	9	858.500
2	854.875	10	858.875
3	855.500	11	859.375
4	855.875	12	860.125
5	856.500	13	860.750
6	857.125	14	861.250
7	857.750	15	861.500
8	858.125	16	861.875

the t.bone TWS 16 BT 863 MHz (item no. 223629)			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	863.125	9	863.250
2	863.375	10	863.500
3	863.625	11	863.750
4	864.000	12	864.125
5	864.250	13	864.375
6	864.500	14	864.625
7	864.750	15	864.875
8	864.875		

the t.bone TWS 16 BT 600 MHz (item no. 269805)			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	606.225	9	619.625
2	607.225	10	621.225
3	609.625	11	621.625
4	610.225	12	624.825
5	611.025	13	625.425
6	611.625	14	627.225
7	615.025	15	628.625
8	619.225	16	629.825

the t.bone TWS 16 BT 740 MHz (item no. 269807)			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	740.625	9	746.625
2	741.375	10	747.250
3	742.375	11	747.875
4	743.125	12	748.500
5	743.750	13	749.375
6	744.375	14	750.125
7	745.250	15	750.875
8	745.875	16	751.500

the t.bone TWS 16 BT 821 MHz (item no. 273716)			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	821.725	9	827.300
2	822.250	10	827.825
3	822.925	11	828.525
4	823.375	12	828.925
5	823.950	13	829.475
6	824.850	14	829.875
7	825.450	15	830.975
8	826.525	16	831.450

8 Protecting the environment

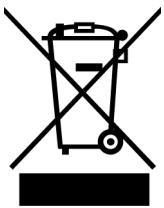
Disposal of the packaging material

For the transport and protective packaging, environmentally friendly materials have been chosen that can be supplied to normal recycling.

Ensure that plastic bags, packaging, etc. are properly disposed of.

Do not just dispose these materials with your normal household waste, but make sure that they are fed to a recovery. Please follow the notes and markings on the packaging.

Disposal of your old device



This device is subject to the European directive 2002/96/EC. Do not dispose the device with your normal household waste.

Dispose this device through an approved waste disposal firm or through your local waste facility. When discarding the device, comply with the rules and regulations that apply in your country. If in doubt, consult your local waste disposal facility.

Disposal of batteries

Batteries must not be disposed of as domestic waste or thrown into fire. Dispose of the batteries according to national or local regulations regarding hazardous waste. To protect the environment, dispose of empty batteries at your retail store or at appropriate collection sites.